

AMENDMENT

IN THE SPECIFICATION

Please amend the specification as follows.

At page 3, lines 22-29:

More specifically, in accordance with a particular embodiment of the present invention, the non-intensity modulated optical information signals may be converted to intensity modulated signals using an asymmetric ~~Mach-Zender~~ Mach-Zehnder interferometer. In this embodiment, the ~~Mach-Zender~~ Mach-Zehnder interferometer may have a free spectral range coinciding with a channel spacing of the WDM signal or an integer multiple of ~~the signal~~ a channel spacing of the WDM signal.

At page 5, lines 26-29:

FIGURE 7 is a diagram illustrating the frequency response of the asymmetric ~~Mach-Zender~~ Mach Zehnder interferometer of FIGURE 6 in accordance with one embodiment of the present invention;

At page 11, line 26-page 12, line 3:

In accordance with one embodiment, modulator 74 modulates the ~~phrase~~ phase, frequency or other suitable non-intensity characteristic of the carrier signal with the data signal 74. As previously described, this generates a non-intensity optical information signal 24 with poor susceptibility to cross talk due to XGM in long-haul and other transmission systems using bi-directional DRA or other distributed amplification. Details of the carrier wave, frequency modulation of the carrier wave and phase modulation of the carrier wave are illustrated in FIGURES 3A-C.

At page 13, lines 22-31:

Referring to FIGURE 6, the optical receiver 32 includes an asymmetric interferometer 100 and a detector 102. The interferometer 100 is an asymmetric ~~Mach-Zender~~ Mach Zehnder or other suitable interferometer operable to convert a non-intensity modulated optical information signal 24 into an intensity modulated optical

information signal for detection of data by the detector 102. Preferably, the ~~Mach-Zender~~ Mach Zehnder interferometer 100 with wavelength dependent loss and good rejection characteristics for the channel spacing.

At page 13, line 32-page 14, line7:

The ~~Mach-Zender~~ Mach-Zehnder interferometer 100 splits the received optical signal into two interferometer paths 110 and 112 of different lengths and then combines the two paths 110 and 112 interferometrically to generate two complimentary output signals 114 and 116. In particular, the optical path difference (L) is equal to the symbol rate (B) multiplied by the speed of light (c) and divided by the optical index of the paths (n). Expressed mathematically: $L=Bc/n$.

At page 14, lines 8-15:

In a particular embodiment, the two path lengths 110 and 112 are sized based on the symbol, or bit rate to provide a one symbol period, or bit shift. In this embodiment, the ~~Mach-Zender~~ Mach Zehnder interferometer 100 has a wavelength dependent loss that increases the rejection of neighboring channels when channel spacing comprises the symbol transmission rate multiple within 0.4 to 0.6 of an integer as previously described.

At page 14, lines 16-29:

The detector 102 is a dual or other suitable detector. In one embodiment, the dual detector 102 includes photodiodes 120 and 122 connected in series in a balanced configuration and a limiting amplifier 124. In this embodiment, the two complimentary optical outputs 114 and 116 from the ~~Mach-Zender~~ Mach Zehnder interferometer 100 are applied to the photodiodes 120 and 122 for conversion of the optical signal to an electrical signal. The limiting electronic amplifier 124 converts the electrical signal to a digital signal (0 or 1) depending on the optical intensity delivered by the interferometer 100. In another embodiment, the detector 102 is a single detector with one photodiode 122 coupled to output 116. In this embodiment, output 114 is not utilized.

At page 14, line 30-page 15, line 8:

FIGURE 7 illustrates the frequency response of the asymmetric ~~Mach-Zehnder~~ Mach Zehnder interferometer 100 in accordance with one embodiment of the present invention. In this embodiment, channel spacing comprises the symbol transmission rate multiple within 0.4 to 0.6 of an integer as previously described. As can be seen, optical frequency of neighboring channels is automatically rejected by the asymmetric ~~Mach-Zehnder~~ Mach Zehnder interferometer 100 to aid channel rejection of the demultiplexer 30. It will be understood that the asymmetric ~~Mach-Zehnder~~ Mach Zehnder interferometer may be used in connection with other suitable channel spacings.

At page 15, line 27-page 16, line 9:

The multichannel format converter 131 converts phase modulation to intensity modulation and may be an asymmetric ~~Mach-Zehnder~~ Mach Zehnder interferometer with a one-bit shift to convert non-intensity modulated signals to intensity modulated signals as previously described in connection with interferometer 100 or suitable optical device having a periodical optical frequency response that converts at least two phase or frequency modulated channels into intensity modulated WDM signal channels. The intensity-conversion interferometer may be prior to the first stage demultiplex element 130, between the first and second stages or between other suitable stages. The other demultiplex elements 130 may comprise filters or non-conversion ~~Mach-Zehnder~~ Mach Zehnder interferometers operable to filter the incoming set of channels 132 into the two sets of output channels 134.

At page 16, lines 10-25:

In a particular embodiment, the multichannel format converter 131 is an asymmetric ~~Mach-Zehnder~~ Mach Zehnder interferometer with a free spectral range coinciding with the WDM channel spacing or its integer sub-multiple. This allows all the WDM channels to be converted within the ~~Mach-Zehnder~~ Mach Zehnder interferometer simultaneously. In this embodiment, a channel spacing may be configured based on the channel bit rate which defines the free spectral range. Placement of the intensity-

conversion ~~Mach-Zender~~ Mach Zehnder interferometer in the demultiplexer 30 eliminates the need for the interferometer 100 at each optical receiver 32 which can be bulky and expensive. In addition, the demultiplexer 30 including the ~~Mach-Zender~~ Mach Zehnder and other demultiplexer elements 130 may be fabricated on a same chip which reduces the size and cost of the WDM receiver 14.

At page 16, line 26-page 17, line 17:

Referring to FIGURE 8B, the demultiplexer 30 comprises a plurality of wavelength interleavers 133 and a multichannel format converter 135 for each set of interleaved optical information signals output by the last stage wavelength interleavers 133. Each wavelength interleaver 133 separates a received set of channels into two discrete sets of interleaved channels. The multichannel format converters 135 may be asymmetric ~~Mach-Zender~~ Mach Zehnder interferometers with a one-bit shift to convert non-intensity modulated signals to intensity modulated signals as previously described in connection with interferometer 100 or other suitable optical device. Use of the wavelength interleavers as part of the WDM demultiplexing in front of the format converters allow several WDM channels to be converted simultaneously in one ~~Mach-Zender~~ Mach Zehnder interferometer even if the free spectral range of the interferometer does not coincide with an integer multiple of the WDM channel spacing. FIGURE 8C illustrates transmissions of four ~~Mach-Zender~~ Mach Zehnder interferometers for a particular embodiment of the demultiplexer 30 using wavelength interleavers 133 in which the free spectral range is three quarters of the channel spacing. In this embodiment, the four ~~Mach-Zender~~ Mach Zehnder interferometers may be used to convert all of the WDM channels.